Inequalities between retirees and workers: an empirical model to capture the effect of taxation

Bérangère Legendre

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1. Introduction

French pensioners benefit from tax deductions. In the context of pension system reform and given the impact of the current financial and economic crisis on government deficits, the tax preference given to senior citizens raises questions. Lavigne (2006) asks, "Should we give tax benefits to the elderly?" The author explains that the tax benefits given to retirees imply considerable public tax expenditures that are unjustifiable in terms of equity. Current retirees enjoy an average standard of living, nearly equivalent to that of persons in the labour force (See El Mekkaoui De Freitas et al., 2008, and *Conseil d'Orientation des retraites*, 2009). According to the French statistical institute (INSEE), the ratio of retired individuals' income per consumption unit to that of workers was approximately 0.89 in 2003 (0.96 including capital income). Moreover, pensioners' incomes are, on average, 102% of the average income of the population. Inter-cohort inequalities do not seem to justify these tax exemptions. Pensions are more equally distributed than income received from employment (See Brown and Prus, 2006), and intra-cohort inequality does not seem to be a more convincing explanation.

The existence of an increased risk of poverty among pensioners is also a questionable justification for this preferential tax treatment. According to the INSEE, the poverty rate is greater among labour force participants than among retirees. With a poverty threshold set at 60% of the median income, the poverty rate for pensioners amounted to 9.6% in 2006 compared to 9.8% for those in the labour force. With a threshold set at 50% of the median income, the INSEE estimates the poverty rate for men aged 60-74 to be 3.6% compared to 6.4% for 50- to 59-year-old men. However, according to Eurostat, the poverty rate for people over 60 years of age was 6.9% in 2007 but only 6.5% among those under the age of 60. Eurostat's results show an increasing poverty trend among retirees since 2009: 7.4% among people aged 60 and over compared to 4.8% for those under 60.

Several phenomena with opposing effects influence the living standards of pensioners. Young people and future retirees have or will have experienced more setbacks than middle aged people during their careers (See Cloarec, 2000, Colin, Iehlé and Mahieu, 2000, and Briard *et al.*, 2009). It is therefore more difficult for individuals of these generations to meet all of the requirements for a full pension beginning at retirement age. Moreover, several reforms have contributed to increasing the contributory demands of the French pension system:
- Increased career duration,
- A higher legal retirement age,
- The establishment of a discounting mechanism.

These phenomena have resulted in an increased risk of poverty for future generations of retirees (See Franco *et al.*, 2009). However, this risk is offset by the increased participation of women from younger generations in the labour market and by an increase in the average skill level.
In this preliminary research, we examine the adequacy of tax arrangements for French retirees. What is the impact of differential taxation on the inequality between retirees and workers?

2. Taxation in France

French pensioners benefit from specific tax rules concerning income taxation, social contributions, housing and property taxes. These are the most important examples:

- Elderly people benefit from a 10% reduction in taxes if they are retired. The age of a taxpayer may also prompt special discounts. For example, for retirees over the age of 65, an allowance of 1,138 euros is provided if the overall net income is between 14,010 and 22,590 euros. This allowance may be up to 2,276 euros if the total net income is less than or equal to 14,010 euros. This policy has no age limit for disabled individuals.
- The taxation of a life annuity depends on the age when its holder first received the entitlement. If the holder was under 50 at enrolment, 70% of the amount of the annuity is taxable. If the beneficiary waits until age 60, the taxable portion drops to 40%.
- An exemption from the property tax on buildings is planned for retirees older than 75 years. This exemption is subject to the individual's income. Retirees aged 65 to 75 years are also eligible for a rebate of 100 euros.
- Residents living in a nursing home do not pay the housing tax. People over the age of 60 can be exempted from housing tax, subject to the income of the individual. If retirees over 60 live with one or more adult children seeking employment, they receive automatic relief from paying the housing tax.
- Concerning social contributions, retirees may receive exemptions depending on their income level. When they are subject to taxation, they often benefit from lower tax rates.

According to Ferrand and Lenseigne (2010), some of these tax dispositions are no longer relevant in France. Recent studies show that retired and active households have equivalent standards of living (See COR, 2009, and Legendre, 2010). Other tax rules remain useful when they respond to a precise social need. For instance, expenses related to a person's disability are eligible for specific tax cuts.

3. Survey and empirical model

We use data from the European survey EU-SILC (Community Statistics on Income and Living Conditions) for 2004 to 2007. Specifically, we use the French data from the SRCV (Statistics on Resources and Living Conditions) included in the European survey and conducted by the National Institute of Statistics and Economic Studies (INSEE).
The French SILC (Community Statistics on Income and Living Conditions) survey addresses issues relating to poverty and the living conditions of individuals and households. It provides information on the taxes and social security costs incurred by households as well as social benefits.

We create two representative and exhaustive samples of the population:

- The retired sample includes individuals declaring that they are retired,

- The sample of workers includes the active population of employed and unemployed people seeking a job.

Retaining only those individuals from either exclusively active households or exclusively retired households, we propose an indicator for the inequality between the active population and retirees:

$$y_{c,t} = y_{c,t}^{act} - y_{c,t}^{ret}, \forall c \in [1,100] \quad (1)$$

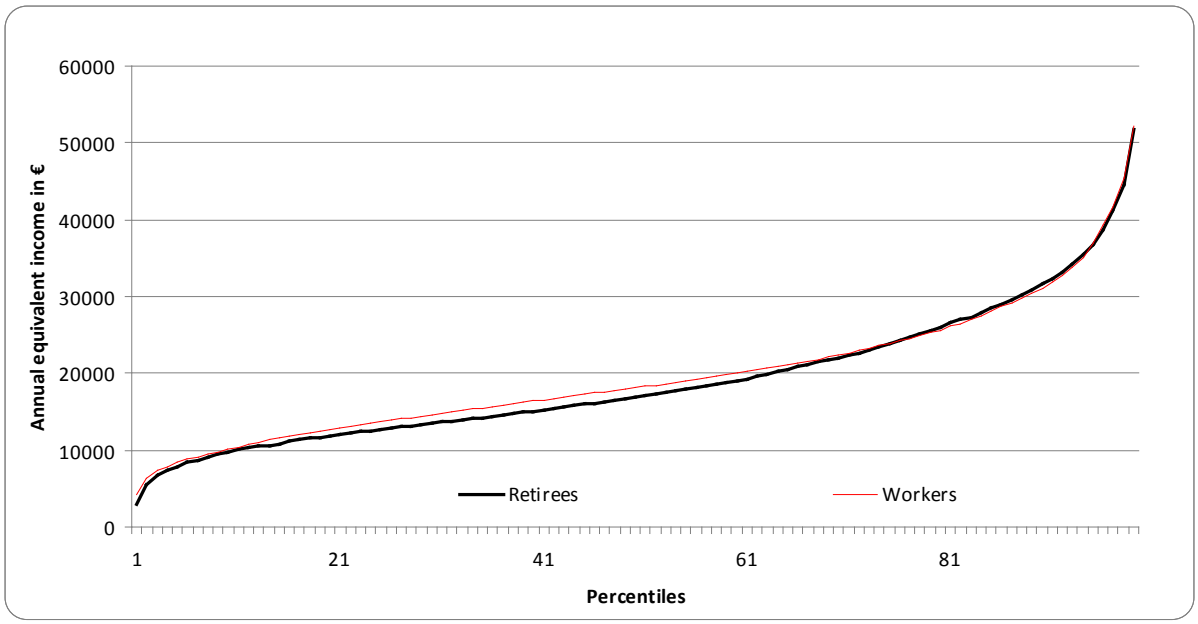
where $y_{c,t}^{act}$ is the average equivalent income of the active population ranged by percentile, c, and $y_{c,t}^{ret}$ is the equivalent income of retirees ranged by percentiles (see figure 1).

The figure 1 depicts the equivalent income over the distribution among retirees and workers. We note that individuals belonging to the lowest percentiles of workers receive a higher equivalent income than individuals belonging to the highest percentiles of retirees. But from the 76th to the 84th percentile, retirees receive a higher equivalent income than workers.

In the following procedure, we explain the difference between $y_{c,t}^{act}$ and $y_{c,t}^{ret}$, depicted in the figure 1. This difference is taken as a proxy for inequality between workers and retirees, and is represented by the indicator $y_{c,t}$.

This indicator $y_{c,t}$ allows us to compare the retired population and the active population despite the different sizes of the samples.

Figure 1 Income distribution: equivalent incomes by percentile, 2007



Within the households, we assign each member an equivalent disposable income. The OECD (Organisation for Economic Cooperation and Development) equivalence scale is used in which one unit of consumption is attributed to the first household adult member, 0.5 to other members over the age of 14, and 0.3 to children under 14.

We first propose an OLS specification using data for the years 2004 to 2007.
y_c indicates the inequality between retirees and workers and is the dependant variable in the following specification:

$$y_c = \beta X_c + \varepsilon_c \tag{2}$$

where X_c includes the explanatory variables. As explained above, French retirees benefit from specific tax rules. Consequently, we introduce the following tax variables:

- Social contributions paid by retirees, as a percentage of the equivalent disposable income,
- Social contributions paid by workers,
- Income tax and housing tax paid by retirees,
- Income tax and housing tax paid by workers,
- Property tax paid by retirees,
- Property tax paid by workers,
- Solidarity tax on wealth (STW) paid by retirees,
- STW paid by workers.

Next, we introduce variables to control for the impact of socio-economic phenomena:

- The mean age of the samples (retired and active),
- The mean age at the end of the studies,
- The mean number of household members by percentile,
- The proportion of women in the percentiles,
- The proportion of homeowners,
- The proportion of foreign-born persons,
- The proportion of executives,
- The proportion of farmers,
- The proportion of white collar workers,
- The proportion of blue collar workers,
- The proportion of employees.

Given the presence of outliers in our data, the classical least squares estimator may be distorted. To correct for this bias, we propose different robust-to-outliers methods from the literature.
First, we calculate the Cook distances to indicate data points that are particularly worth checking for validity. Data points with large outliers and/or high leverage may distort the outcome and accuracy of the OLS regression. Consequently, observations associated with a Cook distance larger than 1 receive a zero weight. We then employ a Tukey biweight loss function.

Cook distances are able to identify isolated outliers, but they are inappropriate in cases with clusters of outliers. Rousseew and Van Zommeren (1990) show that one outlier can mask the presence of another. Full robustness can be achieved using the Salibian-Barrera and Yohaï (2006) estimator. It consists of randomly selecting N subsets with p observations (p-subsets), where *p* is the number of estimated parameters. Each p-subset is defined such that it does not contain outliers. The number of N subsets is generated to guarantee that at least one p-subset

without outliers is selected with high probability (See Salibian-Barrera and Yohaï, 2006, and Verardi and Croux, 2009):

$$N = \left[\frac{\log(1 - P_{clean})}{\log[1 - (1 - \alpha)]^P} \right] \quad (3)$$

where α is the expected proportion of outliers (equal to 0.2), p is the number of estimated parameters and *Pclean* is the desired probability of having at least one p-subset without outliers among N subsets. This probability is fixed at 0.99.

We also propose a model with panel data from 2004 to 2007. Given the short temporal dimension, we prefer a random effects model. The Hausman test confirms that this specification is a better fit for our data (see table 5 in the appendix).

Assuming that the entity's error term is not correlated with the regressors, the empirical model is formulated as follows:

$$y_{c,t} = X_{c,t}\alpha + \varepsilon_{c,t} \quad (4)$$

$$\varepsilon_{c,t} = \tau_c + \rho_{c,t} \quad (5)$$

where the dependent variable, $y_{c,t}$, represents the difference between the equivalent incomes of active people and retirees across percentiles. $X_{c,t}$ includes the explanatory variables. $\varepsilon_{c,t}$ follows a multivariate normal distribution with mean 0. τ_c and $\rho_{c,t}$ are dependant variables having standard normal distributions.

4. Results

The different specifications proposed indicate the impacts of the income tax, social contributions, property taxes and the housing tax on the inequality between workers and retirees (see tables 1 to 4 in the appendix).
Using linear regressions, robustness analysis and panel regressions, we highlight the significant and positive impact of the social security contributions paid by the active population on the size of the inequality. Housing taxes paid by workers also have a significant and positive impact on the inequality between workers and retirees. In other words, the correlation between the impact of these taxes and our dependent variable is positive, indicating an increasing trend in the income gap between the working population and retirees.
In contrast, we demonstrate the significant and negative impact of the social contributions paid by pensioners, their housing and income taxes. When these taxes increase, the gap between the disposable income of working people and retirees tends to decrease.

These results show that a reduction in tax deductions specifically for retirees could reduce the gap in living standards between the active population and the retired population. While some

tax relief involves targeted services (personal services) with social objectives, other types do not have an economic or social justification. For example, the 10% income tax deduction for retirees and the 10% deduction allocated to workers for business expenses have no economic justification, especially when the retired household has a high standard of living. When the income tax paid by retirees increases by one percentage point relative to disposable income, the gap in living standards between workers and pensioners seems to fall by approximately 0.39 euro.

Decreasing the housing tax paid by workers or reducing the income tax paid by working households would also reduce inequality. The results of the robust estimation using the Salibian-Barrera method (see table 3 in the appendix) show that a one percentage point increase in the property tax paid by active persons would imply an increase in the gap between the living standards of workers and retirees of 0.2 euro.
We observe a significant and positive impact of the proportion of homeowners among the active population. The higher the proportion of homeowners among workers, the greater the income gap. Retirees are more frequently homeowners, and this allows them to relax their budget constraints. On the contrary, the mortgage or rent payments constitute a heavy burden for active households. If the average proportion of homeowners among workers increases by one percentage point, the income gap between workers and retirees increases by 9 euros, on average (see table 3 in the appendix).

5. Concluding remarks

Different tax rules are applied to members of the labour force and retired people. However, the degree of inequality between the two groups and the living standards of pensioners do not seem to justify the existence of unequal treatment (See Legendre, 2010). Our empirical analysis suggests that an increase in social contributions for pensioners and a reduction in some of their income tax advantages could reduce the income gap between the active and retired populations.

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Appendix

Table 1 OLS model explaining inequalities

	Coefficient
Social contribution paid by workers	0.432
Property tax paid by workers	0.959
Housing tax paid by workers	0.066**
Income tax paid by workers	0.03
Solidarity tax on wealth (STW) paid by workers	0.049
Social contribution paid by retirees	-0.389*
Property tax paid by retirees	1.108
Housing tax paid by retirees	0.017
Income tax paid by retirees	-0.389*
Solidarity tax on wealth (STW) paid by retirees	0.056
Number of consumption units within households of workers	-126.61
Mean of the workers by percentile	-83.769
Mean age of workers by percentile at the end of the studies	-211.845
Proportion of homeowners per percentile of workers	199.572
Proportion of foreign workers by percentile	-85.682
Proportion of women among percentiles of workers	342.099
Proportion of farmers within the percentiles of workers	4634.293*
Proportion of executives within the percentiles of workers	-2212.559
Proportion of white collar workers within the percentiles of workers	-4.316
Proportion of employees within the percentiles of workers	3075.964**
Proportion of blue collar workers within the percentiles of workers	2270.289
Number of consumption units within households of retirees	-127.312
Mean of the retirees by percentile	27.771
Mean age of retirees by percentile at the end of the studies	82.948
Proportion of homeowner within per percentile of retirees	-200.495
Proportion of foreign retirees by percentile	-3749.488
Proportion of women among percentiles of retirees	-1357.144
Proportion of farmers within the percentiles of retirees	-1385.968
Proportion of executives within the percentiles of retirees	2380.52

Proportion of white collar workers within the percentiles of retirees	-1156.945
Proportion of employees within the percentiles of retirees	804.443
Proportion of blue collar workers within the percentiles of retirees	899.711
Intercept	2979.751
N	400
R^2	0.246
F(32,367)	59.511
Legend: * : 10%, ** : 5%, *** : 1%	

Table 2 Robust estimation, Tukey biweight

	Coefficient
Social contribution paid by workers	0.09
Property tax paid by workers	0.018
Housing tax paid by workers	0.053*
Income tax paid by workers	0.016
Solidarity tax on wealth (STW) paid by workers	0.014
Social contribution paid by the retirees	-0.02
Property tax paid by the retirees	0.582*
Housing tax paid by the retirees	-1.542**
Income tax paid by the retirees	-0.03
Solidarity tax on wealth (STW) paid by the retirees	0.022
Number of consumption units within households by worker percentile	-16.989
Mean average of the workers by percentile	-29.593*
Mean age of workers by percentile at the end of the studies	-13.353
Proportion of homeowner within per percentile of workers	1437.369***
Proportion of foreign workers by percentile	-1879.87***
Proportion of women among percentiles of workers	-285.7
Proportion of farmers within the percentiles of workers	134.88
Proportion of executives within the percentiles of workers	-2085.71***
Proportion of white collar workers within the percentiles of workers	887.31
Proportion of employees within the percentiles of workers	1400.054
Proportion of blue collar workers within the percentiles of workers	616.72
Number of consumption unities within households of retirees percentiles	57.37
Mean of the retirees by percentile	-22.658

Mean age of retirees by percentile at the end of the studies	-15.175
Proportion of homeowners within the percentiles of retirees	-303.759
Proportion of foreign retirees by percentile	243.69
Proportion of women among percentiles of retirees	-276.628
Proportion of farmers within the percentiles of retirees	-1407.41***
Proportion of executives within the percentiles of retirees	-1983.31***
Proportion of white collar workers within the percentiles of retirees	-436.278
Proportion of employees within the percentiles of retirees	482.848
Proportion of blue collar workers within the percentiles of retirees	681.148
Intercept	3658.153*
N	396
R^2	0.851
F(32,367)	64.78
Legend: * : 10%, ** : 5%, *** : 1%	

Table 3 Robust regression: Salibian and Barrera

	Coefficient
Social contribution paid by workers	0.196***
Property tax paid by workers	-0.506
Housing tax paid by workers	0.055***
Income tax paid by workers	0.13***
Solidarity tax on wealth (STW) paid by workers	0.113
Social contribution paid by retirees	-0.186***
Property tax paid by retirees	0.276
Housing tax paid by retirees	-1.088*
Income tax paid by retirees	-0.159***
Solidarity tax on wealth (STW) paid by retirees	0.027
Number of consumption units within households by worker percentile	10.081
Mean age of the workers by percentile	-2.684
Mean age of workers by percentile at the end of the studies	14.152
Proportion of homeowners within the percentiles of workers	901.407***
Proportion of foreign workers by percentile	-1754.446
Proportion of women among percentiles of workers	19.069
Proportion of farmers within the percentiles of workers	-796.103

Proportion of executives within the percentiles of workers	-2339.7***
Proportion of white collar workers within the percentiles of workers	574.822
Proportion of employees within the percentiles of workers	1212.276
Proportion of blue collar workers within the percentiles of workers	1132.483
Number of consumption units within households of retirees by percentiles	57.456
Mean age of the retirees by percentile	-16.91
Mean age of retirees by percentile at the end of the studies	-47.439
Proportion of homeowners within per percentile of retirees	-272.979
Proportion of foreign retirees by percentile	220.488
Proportion of women among percentiles of retirees	-588.5*
Proportion of farmers within the percentiles of retirees	-1346.7***
Proportion of executives within the percentiles of retirees	-2031.8***
Proportion of white collar workers within the percentiles of retirees	-97.263
Proportion of employees within the percentiles of retirees	491.064
Proportion of blue collar workers within the percentiles of retirees	163.218
Intercept	2152.824
N	400
Legend: * : 10%, ** : 5%, *** : 1%	

Table 4 Model with panel data

	Coefficient
Social contribution paid by workers	0.432***
Property tax paid by workers	0.959
Housing tax paid by workers	0.066
Income tax paid by workers	0.003
Solidarity tax on wealth (STW) paid by workers	0.049
Social contribution paid by the retirees	-0.389***
Property tax paid by the retirees	1.108
Housing tax paid by the retirees	0.017
Income tax paid by the retirees	-0.389***
Solidarity tax on wealth (STW) paid by the retirees	0.056
Number of consumption unities within households of workers percentile	-126.616

Mean age of the workers by percentile	-83.769
Mean age of workers by percentile at the end of the studies	-211.845
Proportion of homeowner within per percentile of workers	199.572
Proportion of foreign workers by percentile	-85.682
Proportion of women among percentiles of workers	342.099
Proportion of farmers within the percentiles of workers	4634.293
Proportion of executives within the percentiles of workers	-2212.559
Proportion of white collar workers within the percentiles of workers	-4.316
Proportion of employees within the percentiles of workers	3075.96*
Proportion of blue collar workers within the percentiles of workers	2270.289
Number of consumption units within households of retirees percentiles	-127.312
Mean age of the retirees by percentile	27.771
Mean age of retirees by percentile at the end of the studies	82.948
Proportion of homeowner within per percentile of retirees	-200.485
Proportion of foreign retirees by percentile	-3749.488
Proportion of women among percentiles of retirees	-1357.144
Proportion of farmers within the percentiles of retirees	-1385.968
Proportion of executives within the percentiles of retirees	2380.591
Proportion of white collar workers within the percentiles of retirees	-1156.945
Proportion of employees within the percentiles of retirees	804.443
Proportion of blue collar workers within the percentiles of retirees	899.711
Intercept	2979.751
N	400
Chi2(32)	119.782
Legend: * : 10%, ** : 5%, *** : 1%	

Table 5 Tests

Hausman test	Chi2(32)=13.36
	Prob>Chi2=0.94
Breusch Pagan test	Chi2(1)=36.12
	Prob>Chi2=0.00